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(54) AUTHENTICATION OF GAME RESULTS

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(52) **U.S. Cl.** **463/22**; 463/29

(58) **Field of Classification Search** 463/1, 463/16, 22, 25, 29, 40–43; 380/1, 2, 251, 380/255, 258, 259, 264, 59, 265, 277–279, 380/44–46, 18–33, 282
See application file for complete search history.

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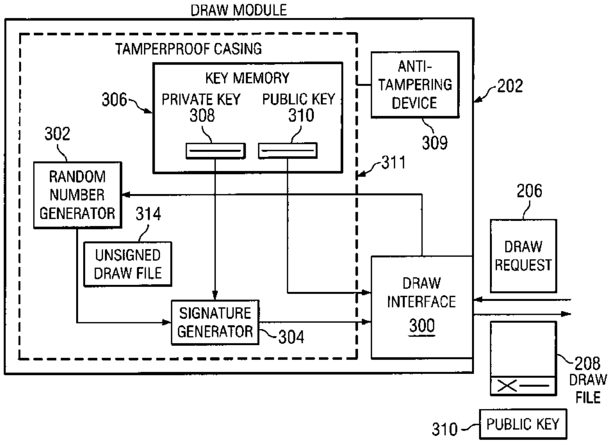
(57) ABSTRACT

A gaming system includes a game server and a client server. The client server requests random numeric outcomes from the game server and supplies various state and game information. The game server generates one or more random numeric outcomes. The game server communicates the random numeric outcomes to the client server to be used in making a win determination. For purposes of future authentication, the game server stores a digitally-signed file that includes the random numeric outcomes and the state and game information.

9 Claims, 4 Drawing Sheets



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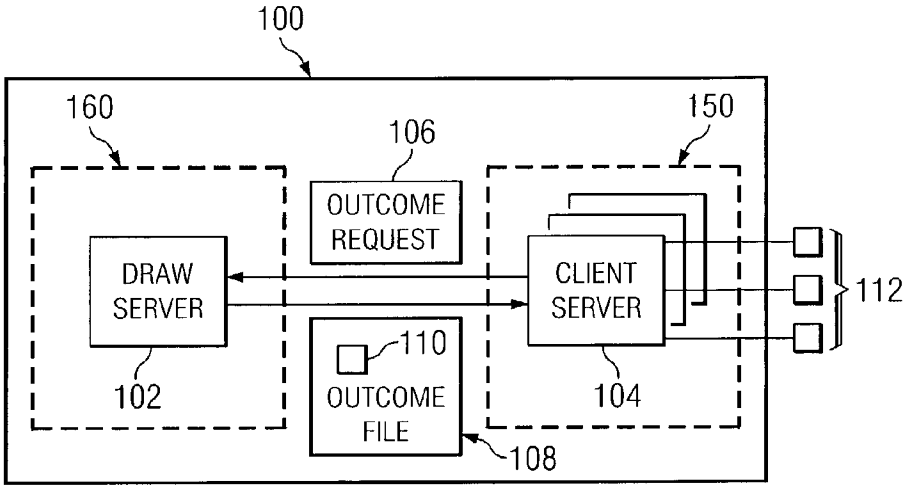


FIG. 1

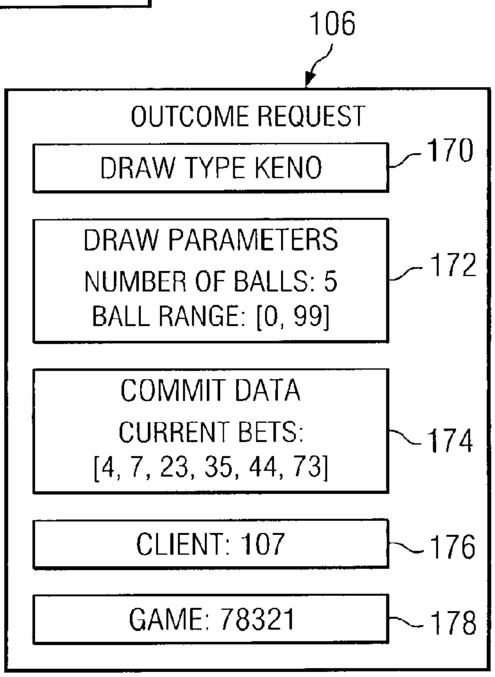


FIG. 2

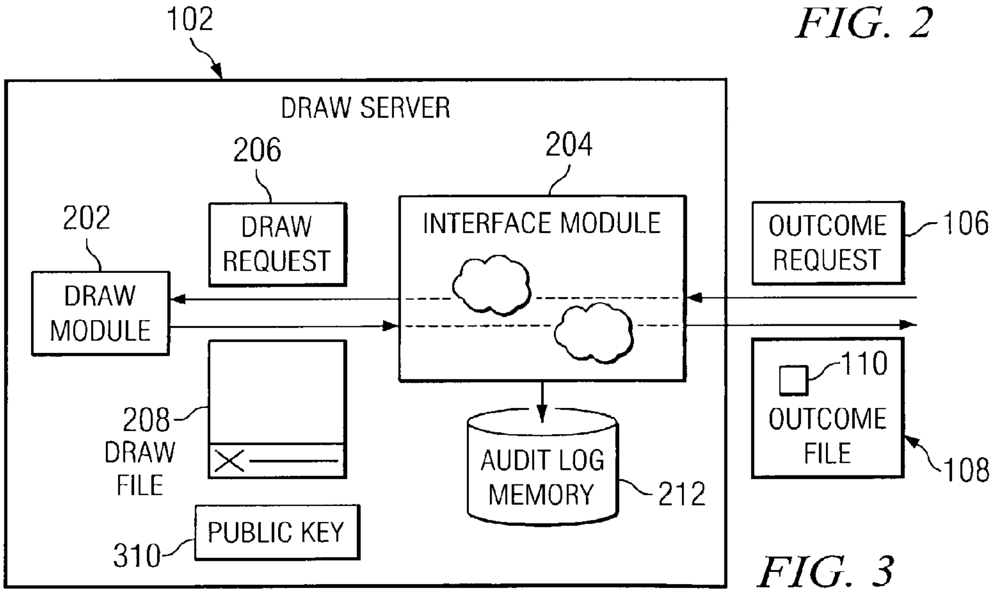


FIG. 3

FIG. 4

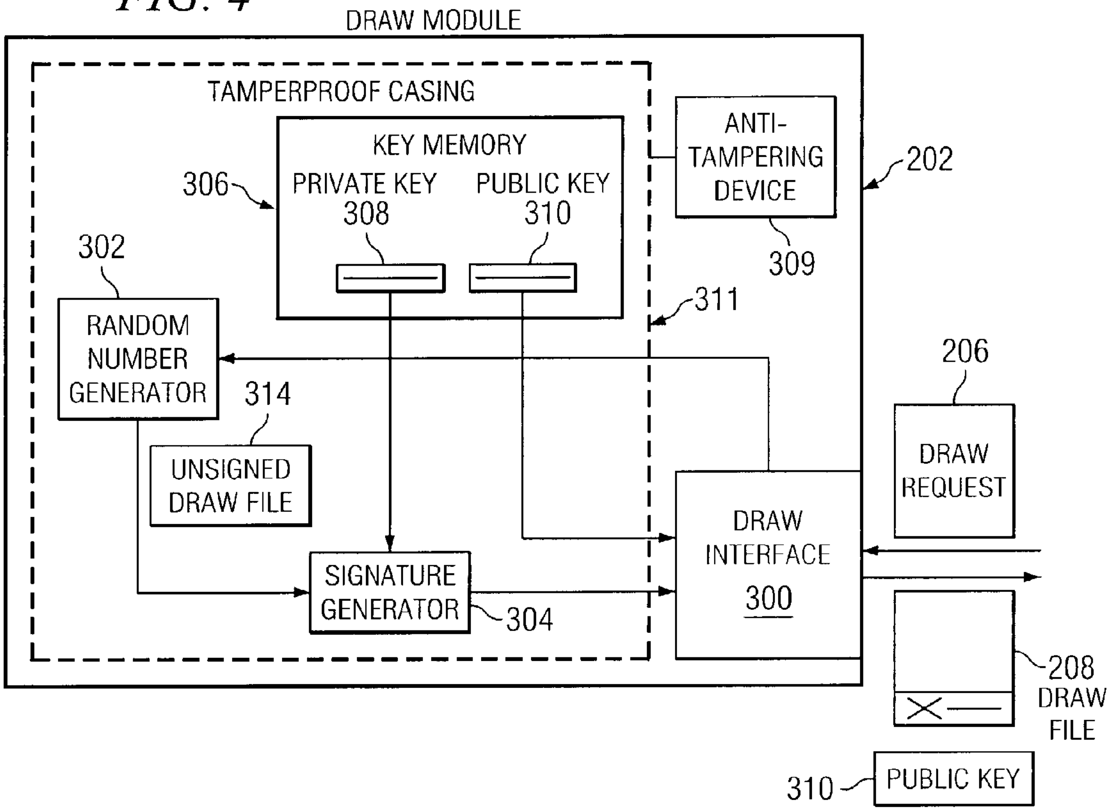

DRAW MODULE
TAMPERPROOF CASING
KEY MEMORY
PRIVATE KEY
308
PUBLIC KEY
310
306
ANTI-TAMPERING DEVICE
309
202
302
RANDOM NUMBER GENERATOR
311
314
UNSIGNED DRAW FILE
SIGNATURE GENERATOR
304
DRAW INTERFACE
300
206
DRAW REQUEST
208
DRAW FILE
310
PUBLIC KEY

FIG. 6

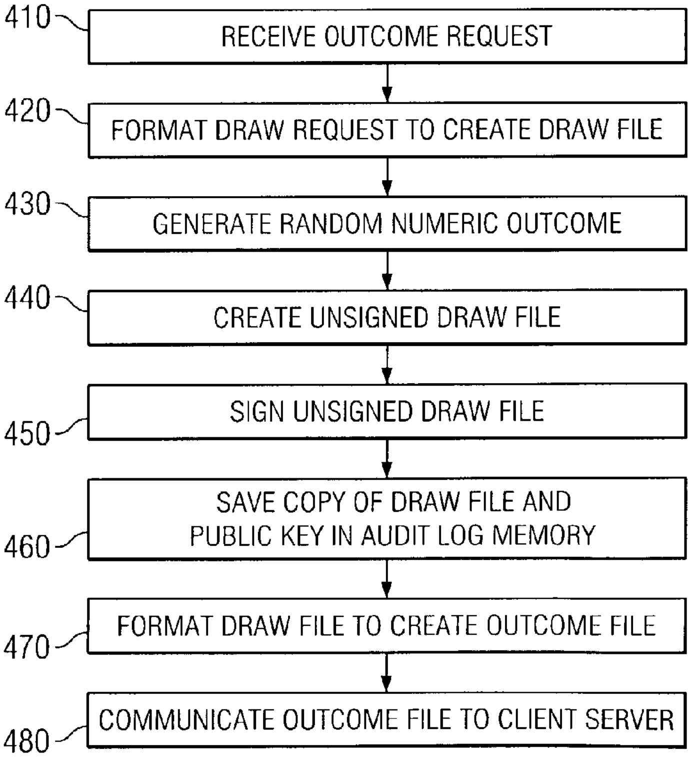

410
RECEIVE OUTCOME REQUEST
420
FORMAT DRAW REQUEST TO CREATE DRAW FILE
430
GENERATE RANDOM NUMERIC OUTCOME
440
CREATE UNSIGNED DRAW FILE
450
SIGN UNSIGNED DRAW FILE
460
SAVE COPY OF DRAW FILE AND PUBLIC KEY IN AUDIT LOG MEMORY
470
FORMAT DRAW FILE TO CREATE OUTCOME FILE
480
COMMUNICATE OUTCOME FILE TO CLIENT SERVER

FIG. 5A

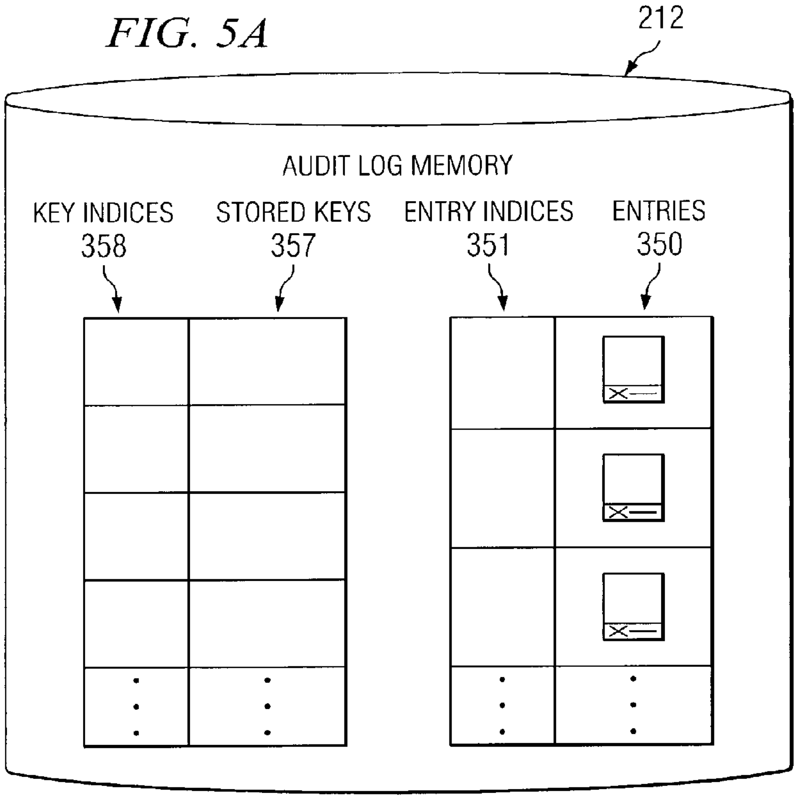


FIG. 5B

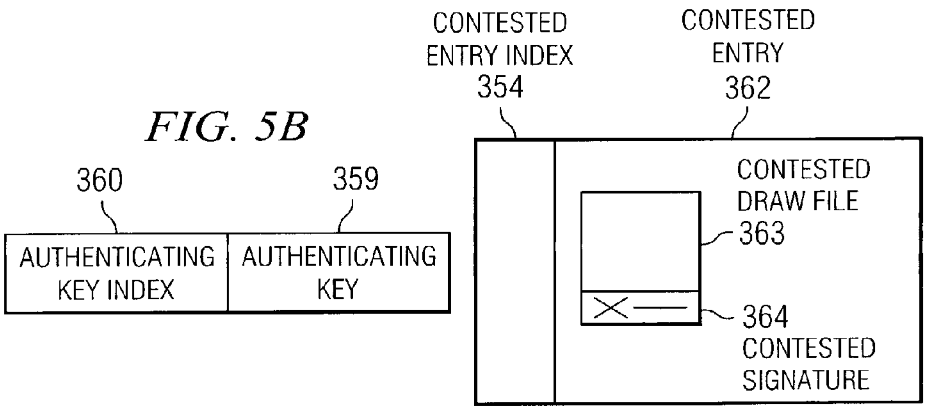
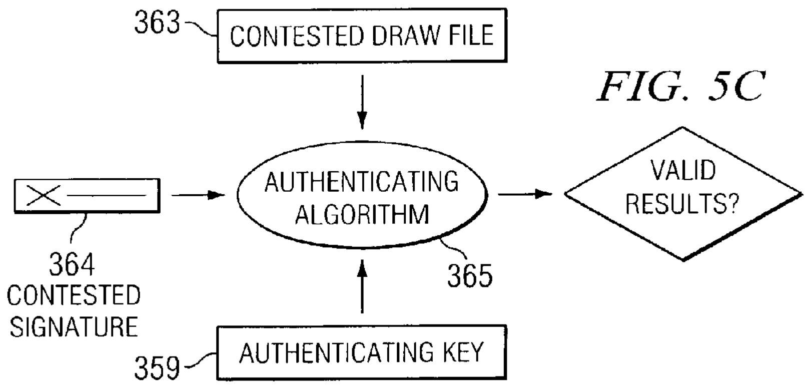


FIG. 5C



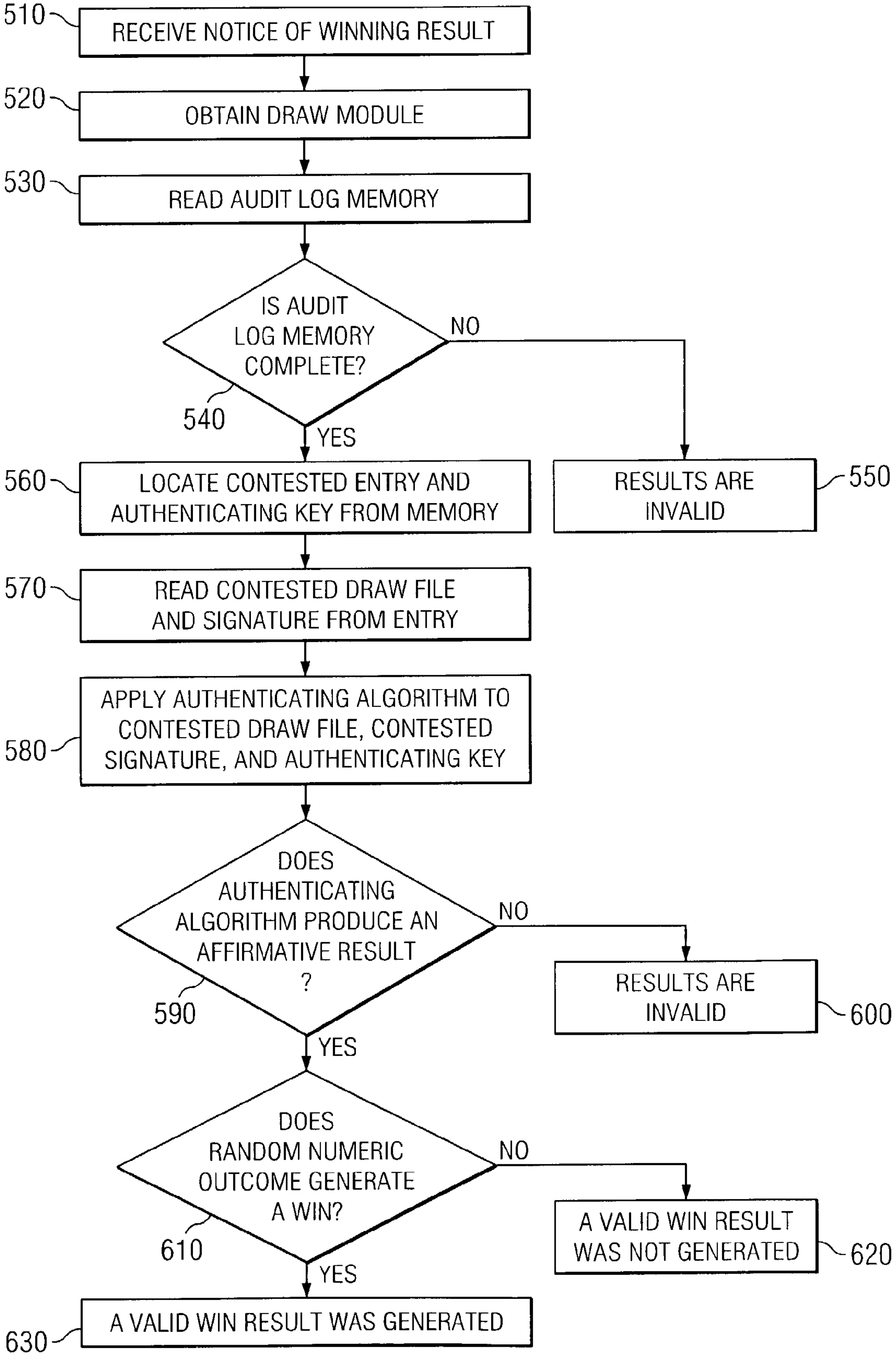

510
RECEIVE NOTICE OF WINNING RESULT
520
OBTAIN DRAW MODULE
530
READ AUDIT LOG MEMORY
IS AUDIT LOG MEMORY COMPLETE?
540
NO
YES
RESULTS ARE INVALID
550
560
LOCATE CONTESTED ENTRY AND AUTHENTICATING KEY FROM MEMORY
570
READ CONTESTED DRAW FILE AND SIGNATURE FROM ENTRY
580
APPLY AUTHENTICATING ALGORITHM TO CONTESTED DRAW FILE, CONTESTED SIGNATURE, AND AUTHENTICATING KEY
DOES AUTHENTICATING ALGORITHM PRODUCE AN AFFIRMATIVE RESULT ?
590
NO
RESULTS ARE INVALID
600
YES
DOES RANDOM NUMERIC OUTCOME GENERATE A WIN?
610
NO
A VALID WIN RESULT WAS NOT GENERATED
620
YES
A VALID WIN RESULT WAS GENERATED
630

FIG. 7

AUTHENTICATION OF GAME RESULTS

TECHNICAL FIELD OF THE INVENTION

This invention relates in general to games of chance, and more particularly to a gaming system that provides for authentication of generated results.

BACKGROUND OF THE INVENTION

The gaming industry has enjoyed a substantial increase in popularity over the last decade. This increased popularity has produced an extremely competitive market for game operators.

Despite the increasingly competitive nature of the industry, a game operator responsible for paying out prizes may be unwilling to rely on innovations developed by others if the game operator lacks the expertise to understand the technology, its potential for error, and how it will impact the game operator's prize obligations. Therefore, to facilitate the introduction and acceptance of innovations into this competitive market, a system is desired that will shift responsibility for prize disbursement to a game sponsor, typically the innovator, who is more knowledgeable about the operation of the innovation and more capable of predicting and preventing its malfunction.

However, a system in which the game operator conducts the game but the game sponsor is responsible for paying winners will encourage fraud by game operators who can alter game situations to generate excessive winners. Additionally, game sponsors may not want to be burdened with the details of operating the game on their own. Consequently, a method is desired for operating a game in which a game sponsor can agree to reimburse the game operator for all prizes disbursed, but be assured that the game operator will not fraudulently generate winners.

Additionally, game operators may choose to conduct a wide range of games. Thus, to prevent continual re-design, a system is desired that allows a game sponsor to generate random results for a wide variety of different games conducted by multiple operators.

SUMMARY OF THE INVENTION

In accordance with the present invention, the disadvantages and problems associated with a gaming system have been substantially reduced or eliminated. In particular, the invention provides a method and system for providing random numeric outcomes to be used in determining whether a win has occurred in a game of chance, the method and system being both flexible and fraudproof.

In accordance with one embodiment of the present invention, a method for providing numeric outcomes to a game operator comprises receiving a request that includes a game type of a game, game parameters, and commit data describing the game; generating one or more random numeric outcomes using the request; storing the commit data and the random numeric outcomes in an audit log; and communicating the random numeric outcomes to a game operator to be used by the game operator to determine whether a win has occurred.

In accordance with another embodiment of the present invention, a method of authenticating a win result for a game of chance comprises receiving a claim regarding a win result in a game; retrieving an entry from an audit log, the entry comprising one or more random numeric outcomes and commit data associated with the game; verifying that the random numeric outcomes were generated properly; and using the commit data to verify that the random numeric outcomes in the entry results in the win result.

Important technical advantages of certain embodiments of the present invention include the ability to authenticate win determinations made on the basis of random numeric outcomes. Other important technical advantages of certain embodiments of the present invention include providing random numbers for a plurality of game operators and game devices, producing outcomes for a variety of games, and updating a signature key to provide a verifiable signature.

Additional technical advantages of the present invention will be readily apparent to one skilled in the art from the following figures, description, and claims. Moreover, while specific advantages have been enumerated above, various embodiments may include all, some, or none of the enumerated advantages.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and its advantages, reference is now made to the following description, taken in conjunction with the accompanying drawings, in which:

FIG. **1** illustrates a system which includes a draw server, a client server, and at least one player;

FIG. **2** illustrates an outcome request according to one embodiment of the present invention;

FIG. **3** is a block diagram illustrating the contents and operation of a draw server;

FIG. **4** is a diagram illustrating operation of a draw module in producing an outcome from a request;

FIG. **5A** is a diagram illustrating details about the operation of an audit log memory;

FIG. **5B** is a diagram illustrating further details about the operation of an audit log memory;

FIG. **5C** is a diagram illustrating further details about the operation of an audit log memory;

FIG. **6** is a flowchart illustrating the operation of a draw server in one embodiment of the present invention; and

FIG. **7** is a flowchart illustrating authentication of the results of a game.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** illustrates a gaming system **100** for playing a game of chance that includes a draw server **102**, a client server **104**, and players **112**. Draw server **102** couples to client server **104**. Client server **104** is in communication with players **112**. Gaming system **100** can be adapted to generate one or more random numeric outcomes **110** to be used in making a win determination for a wide range of games including, but not limited to bingo, keno, and a variety of number-guessing games.

Draw server **102** and client server **104** can be general purpose computers, dedicated microprocessors, or other processing devices capable of communicating electronic information. Examples of draw server **102** and client server **104** include application-specific integrated circuits (ASICs), field-programmable gate arrays (FPGAs), digital signal processors (DSPs) and any other suitable specific or general purpose processors.

While FIG. **1** illustrates an embodiment of gaming system **100** including one client server **104**, gaming system **100** may include any number of client servers **104**. Draw server **102** may generate random numeric outcomes **110** for games conducted by multiple client servers **104**.

Draw server **102** may couple to client server **104** in various ways. In a particular embodiment, draw server **102** and client server **104** are physically separated and draw server **102** couples to client server **104** using an Internet connection. In another embodiment, draw server **102** and client server **104** represent devices located in the same computer and draw server **102** couples to client server **104** directly. In general, draw server **102**, client server **104**, and players **112** may communicate using any combination of public or private communications equipment such as elements of a public switched telephone network (PSTN), a global computer network such as the Internet, a local area network (LAN), a wide area network (WAN), or other appropriate wireline or wireless communications equipment.

Client server **104** may conduct the game in real-time interacting with players **112** simultaneously, or interact with them individually over a period of time. Players **112** may interact with client server **104** locally, such as through a keyboard connected directly to client server **104**, or remotely, such as through another computer that establishes a network connection with client server **104**. Gaming system **100** can be adapted to conduct a game involving any number of players.

Numerous entities may control or operate the elements of gaming system **100** and the entities may use a variety of different configurations to distribute the elements among themselves. In a particular embodiment, a game sponsor **150** and a game operator **160** operate or control draw server **102** and client server, **104** respectively. Game sponsor **150** is a person, group of people, or entity responsible for disbursing prizes won in games conducted on gaming system **100** or for reimbursing others who disburse prizes. Game operator **160** is a person, group of people, or entity responsible for determining the winners of games conducted on gaming system **100**.

In operation, client server **104** conducts a game for players **112**. Client server **104** requests one or more random numeric outcomes **110** from draw server **102** by communicating to draw server **102** an outcome request **106**. Outcome request **106** includes game information that both indicates the type of outcome requested from draw server **102** and describes the state of the game for which client server **104** requests random numeric outcomes **110**.

For some types of games, players **112** may submit input before draw server **102** generates random numeric outcome **110**. For example, in a game of keno, players **112** may choose numbers upon which to wager before a random numeric outcome **110** can be requested from draw server **102**. Other games may not include input from players **112**. For example, a bingo game can proceed with no input from players as the outcome is strictly a result of the balls called and the bingo cards in play. For games with player input, the state information in outcome request **106** includes player input.

Draw server **102** receives outcome request **106** and, based on the game information in outcome request **106**, generates one or more random numeric outcomes **110**. Draw server **102** creates an outcome file **108** containing the random numeric outcomes **110** and digitally signs outcome file **108**. Draw server **102** stores a copy of outcome file **108** and communicates outcome file **108** to client server **104**.

Client server **104** then uses random numeric outcomes **110** in outcome file **108** to generate a win determination based on the rules of the game and the state. For example, if the game is bingo, client server converts random numeric outcomes **110** in outcome request **108** into bingo balls and determines whether a win has occurred based on the bingo cards that are currently being played. For a keno game, client server **104** compares random numeric outcomes **110** to the numbers players **112** bet to determine if a win occurred.

FIG. **2** illustrates further details of the contents of outcome request **106**. Outcome request **106** contains draw information that affects the generation of random numeric outcomes **110** by draw server **102** and game information that describes both the current state of the game being conducted and how client server **104** will use random numeric outcomes **110** to make a win determination. Outcome request **106** can be an electronic file, an electronic message or any other transferable collection of information. Furthermore, although FIG. **2** illustrates an outcome request **106** containing textual information, outcome request may contain information in any format readable by draw server **102**.

In a particular embodiment, this information includes a draw type indicator **170**, draw parameters **172**, and commit data **174**. However, in other embodiments, any or all of this information can be agreed to contractually at the beginning of game operation and need not be included in outcome request **106**.

Additionally, if draw server **102** communicates with a number of client servers **104**, outcome request **106** may include information identifying the particular client server **104** that issued the request, a client identifier **176**, and/or information identifying the particular game for which the client server **104** made the request, a game identifier **178**. Draw server **102** may use client identifier **176** to determine the particular client server **104** to send outcome file **108**. Draw server **102** may include game identifier **178** in outcome file **108** and client server **104** may then use game identifier **178** to determine the particular game for which the random numeric outcomes **110** in outcome file **108** were generated.

Draw type indicator **170** specifies the general type of game for which client server **104** requests random numeric outcomes **110**. For example, if a particular draw server **102** supports bingo, keno, slot-machine, and number-guessing games, draw type indicator **170** specifies which of these types of games client server **104** is conducting.

Draw parameters **172** give specific information about the draw being requested and may vary depending on the type of game client server **104** conducts. For a keno game, this information may include the number of numbers to be generated. For a bingo game, this information may include the number of balls to be drawn and the range of numbers available. For a slot-machine game, this may include the number of reels being used and the number of variations available on each.

Commit data **174** includes various additional information that defines the current state of the game being conducted by client server **104** and indicates how client server **104** will use random numeric outcomes **110** to make a win determination. The content of this information will vary depending on the characteristics of the particular gaming system **100**, the requirements of the game being conducted, and the information game sponsor **150** and game operator **160** have agreed upon contractually.

For example, for a slot machine game, commit data **174** may include information indicating how client server **104** will convert the random numeric outcomes **110** into a slot symbol and what combination of symbols are considered to be a winning result. For a keno game, commit data **174** may include information indicating what numbers players **112** selected. For a bingo game, commit data **174** might include information indicating what cards are currently in play. This information may be a copy of the bingo cards currently being played or card numbers referencing cards game operator **160** and game sponsor **150** have defined contractually. Similarly, commit data **174** may indicate whether the game being played is a basic bingo game or a "blackout" game requiring that all the squares on the card be covered.

Although this information may not be necessary to generate the requested draw, gaming system **100** prevents fraudulent claims by requiring game operator **160** to commit to this information before draw server **102** generates random numeric outcomes **110**. Absent commit data **174**, game operator **160** could redefine the rules or state of the game after receiving random numeric outcomes **110** and generate fraudulent wins. For example, in a bingo game, if game operator **160** were not required to commit to the specific bingo cards currently being played, game operator **160** could simply claim the bingo cards in play included a card that would produce a winner based on random numeric outcomes **110**.

The specific outcome request **106** illustrated in FIG. **2** applies to a keno game in a particular embodiment. Draw type indicator **170** indicates that client server **104** requests a keno draw. Draw parameters **172** indicate that client server **104** needs five balls and that the valid range includes any number from "0" to "99". Commit data **174** indicates that players **112** have bet on the numbers "4", "7", "23", "35", "44", and "73".

FIG. **3** is a block diagram illustrating exemplary components of draw server **102**. Draw server **102** comprises a draw module **202**, an interface module **204**, and an audit log memory **212**.

Interface module **204** facilitates communication between draw module **202** and client server **104**. Additionally, interface module **204** stores a draw file **208** created by draw module **202** in audit log memory **212** to preserve draw file **208** for future authentication.

Draw module **202** generates one or more random numeric outcomes **110** in response to outcome request **106** from client server **104**, and returns draw file **208** containing random numeric outcomes **110** and commit data **174**. Additionally, draw module **202** digitally signs draw file **208** to allow for future authentication.

Interface module **204** and draw module **202** may comprise logic encoded in media for carrying out functions of the system. The logic comprises functional instructions for carrying out programmed tasks. The media comprises computer disks or other suitable computer-readable media, application-specific integrated circuits (ASICs), field-programmable gate arrays (FPGAs), digital signal processors (DSPs) or other suitable specific or general purpose processors, transmission media or other suitable media in which logic may be encoded and utilized.

In one embodiment, draw module **202** comprises a dedicated processor such as an IBM "4758" PCI Cryptographic Coprocessor. The "4758" is a PCI computer board for use in secure network communications and can be installed in most PCs. The "4758" generates random numbers based on an extremely sensitive reading of the temperature inside the "4758". After generating random numbers, the "4758" digitally signs the results using a 1024-bit private key in accordance with Federal Information Processing Standard 186 "Digital Signature Standard".

Audit log memory **212** is a memory device for storing digitally-signed draw files **208** communicated from draw module **202**. Audit log memory **212** can comprise any collection and arrangement of volatile or non-volatile, local or remote devices suitable for storing data, for example, random access memory (RAM) devices, read only memory (ROM) devices, magnetic storage devices, optical storage devices, or any other suitable data storage devices.

In operation, interface module **204** receives outcome request **106** from client server **104**. In response, interface module **204** communicates a draw request **206** to draw module **202**. Draw request **206** contains information included in outcome request **106**. Additionally, if outcome request **106** includes client identifier **176** or game identifier **178**, draw request **206** may or may not include either or both of these depending on the requirements of gaming system **100**.

Depending on the requirements of the particular client server **104** and draw module **202**, interface module **204** may format outcome request **106** to produce draw request **206**. By doing so, interface module **204** may make it feasible to use otherwise incompatible components for client server **104** and draw module **204**, or to include a variety of different types of client servers **104** in gaming system **100**. However, in a particular embodiment, interface module **204** may not need to do any formatting and draw request **206** may be identical to outcome request **106**.

In response to draw request **206**, draw module **202** generates the requested random numeric outcomes **110**. Draw module **202** creates a draw file **208** that is digitally signed and communicates draw file **208** to interface module **204**. Interface module **204** stores a copy of draw file **208** in audit log memory **212**, which may be used for future authentication.

Interface module **204** then communicates outcome file **108** to client server **104**. Outcome file **108** includes information contained in draw file **208**. Outcome file **108** may or may not be digitally signed. As with outcome request **106** and draw request **206**, interface module **204** may format draw file **208** to create outcome file **108** depending on the requirements of draw module **202** and client server **104**. However, in a particular embodiment, outcome file **108** is identical to draw file **208**.

FIG. **4** is a block diagram illustrating exemplary components of draw module **202**. Draw module **202** comprises a draw interface **300**, a random number generator **302**, a signature generator **304**, a key memory **306**, and an anti-tampering device **309**. Draw module **202** is enclosed in a tamperproof casing **311**.

Draw interface **300** receives draw request **206** from interface module **204** and communicates draw request **206** to random number generator **302**. Random number generator **302** generates one or more random numeric outcomes **110** based on draw type indicator **170** and draw parameters **172** in draw request **206**.

Random number generator **302** generates an unsigned draw file **314** which includes random numeric outcomes **110** and commit data **174**. Commit data **174** is included in unsigned draw file **314** to ensure that commit data **174** is preserved for later authentication. Additionally, if draw request **106** included client identifier **176** or game identifier **178**, either or both may be included in unsigned draw file **314**. Random number generator **302** communicates unsigned draw file **314** to signature generator **304**.

Signature generator **304** receives unsigned draw file **314** from random number generator **302**. Signature generator **304** reads a private key **308** from key memory **306**. Signature generator **304** uses private key **308** to digitally sign unsigned draw file **314** to generate draw file **208** with a digital signature **312**. Draw interface **300** communicates draw file **208** to draw interface **300**.

Draw interface **300**, random number generator **302** and signature generator **304** may comprise logic encoded in media for carrying out functions of the system. The logic comprises functional instructions for carrying out programmed tasks. The media comprises computer disks or other suitable computer-readable media, application-specific integrated circuits (ASICs), field-programmable gate arrays (FPGAs), digital signal processors (DSPs) or other suitable specific or general purpose processors, transmission media or other suitable media in which logic may be encoded and utilized.

Key memory **306** holds private key **308** and a public key **310**. Private key **308** and public key **310** are a cryptographic key-pair generated by signature generator **304** to sign and authenticate draw files **208** using conventional techniques for digital signatures. Signature generator **304** uses private key **308** to sign unsigned draw file **314**. In accordance with conventional techniques, public key **310** can later be used to prove that draw file **208** was in fact signed using private key **308**.

For purposes of verification, public key **310** can be read as needed from key memory **306** through draw interface **300**. However, because draw interface **300** does not provide access to private key **308** and because only signature generator **304** can read private key **308**, the value of private key **308** is kept secret. Thus, proving that draw file **208** was signed using private key **308** proves that only draw server **102** could have generated draw file **208** and draw file **208** is therefore authentic.

In a particular embodiment, signature generator **304** generates a new private key **308** and a new public key **310** periodically. In this embodiment, draw module **202** stores old public keys **310** with draw file **208** in the entry audit log **212**. This feature enhances security of gaming system **100** by ensuring that private key **308** remains secret. Tamperproof casing **311** may enclose draw module **202**.

Tamperproof casing **311** can detect if tamperproof casing **311** is opened and can then erase the contents of key memory **306** or otherwise disable draw module **202**. This adds additional security to gaming system **100** by preventing an individual from directly connecting external devices to key memory **306** to read private key **308** or from altering the operation of the components of draw module **202**.

Draw module **202** may include anti-tampering device **309**. Anti-tampering device **309** is capable of detecting or preventing unauthorized operation or alteration of draw module **202** and may represent a single component or multiple components. Anti-tampering device **309** may be designed to prevent one or more potential types of tampering including, but not limited to, electronic, magnetic, or physical tampering. Anti-tampering device **309** may include heat, pressure, photoelectric, or magnetic sensors; surge protectors; a tampering log to record suspicious changes in the physical environment; or any other device suitable to detect, prevent, expose, or record unauthorized operation or alteration of draw module **202**. Anti-tampering device **309** may thwart unauthorized operation or alteration of draw module **202** or alleviate the impact of such activity by disabling all or any portion of draw module **202**, by documenting the activity in a permanent log, by notifying game sponsor **150**, or by any other suitable means.

In a particular embodiment, draw server **102** comprises an IBM "4758" PCI Cryptographic Coprocessor. The "4758" includes anti-tampering devices **309** that can detect temperature changes and X-ray exposure that might affect the circuitry of the "4758". The anti-tampering devices **309** in the "4758" prevent such attempts to alter the circuitry by erasing the private key **308** and public key **310** stored in key memory **306**.

FIG. **5**A illustrates further details of audit log memory **212** and operation of audit log memory **212** during authentication of a winning claim. FIG. **5** relates to an embodiment in which game operator **160** possesses and operates both draw server **102** and client server **104**. In this embodiment, game sponsor **150** is responsible for reimbursing game operator **160** for any prizes disbursed for winning results and, as a result, game sponsor **150** authenticates any claim by game operator **160** that a winning result has occurred.

Audit log memory **212** holds entries **350** which document operation of the draw server **102** on a draw-by-draw basis. Each entry **350** includes a draw file **208** from a draw conducted by draw server **102**. An entry index **351** is associated with each entry **350** to identify the particular game for which draw server **102** generated the included draw file **208**. Entry index **351** may represent game identifier **178** from draw request **206** or any other information that can uniquely identify a game that received random numeric outcomes **110** from draw server **102**. For gaming systems **100** that include multiple client servers **104**, entry index **351** may also include client identifier **176**.

Additionally, in this embodiment, audit log memory **212** holds stored keys **357** and associated key indices **358**. Stored key **357** represents an expired public key **310** that was in effect during a specified period in the past. A key index **358** indicates the time period over which the associated stored key **357** was in effect.

FIGS. **5**B and **5**C illustrate operation of audit log memory **212** during authentication of game results. When a winning claim is presented to game sponsor **150** by game operator **160**, game sponsor **150** obtains audit log memory **212**. Game sponsor **150** verifies that audit log memory **212** contains entries **350** and stored keys **357** for all the draws that have been conducted. If not, audit log memory **212** has been tampered with and any winning results are invalid.

Assuming audit log memory **212** contains a complete history of the operation of draw server **102**, game sponsor **150** locates the particular entry index **351** that corresponds to the game that produced the winning claim, a contested entry index **354**. Game sponsor **150** accesses the entry **350** associated with contested entry index **354**, a contested entry **362**. Contested entry **362** represents the results of the contested game and includes a contested draw file **363** containing a contested signature **364**.

Similarly, game sponsor **150** locates the particular key index **358** that corresponds to the time period in which draw server **102** generated outcomes for the contested game, an authenticating key index **360**. Game sponsor **150** accesses the stored key **357** associated with authenticating key index **358**, an authenticating key **359**.

FIG. **5**C illustrates authentication of the contested draw file **363**. Game sponsor **150** verifies that contested draw file **363** was in fact created by draw server **102** and has been unaltered since creation. More specifically, game sponsor **150** verifies that authenticating key **359** is the public key **310** associated with the private key **308** used to sign contested draw file **363** and that contested draw file **363** has not been altered since contested signature **364** was applied. This is done using conventional digital-signature techniques in which game sponsor **150** uses authenticating key **359**, contested signature **364** and contested draw file **363** as inputs to an authenticating algorithm **365**. Authenticating algorithm **365** generates an affirmative response if draw server **102** generated contested draw file **363** and contested draw file **363** has been unchanged since being signed.

Once game sponsor **150** has proven that contested draw file **363** is in fact valid, game sponsor **150** verifies that contested draw file **363** produced a winning result. Specifically, game sponsor **150** applies random numeric outcomes **110** contained in contested draw file **363** to game and state information provided by commit data **174** in contested draw file **363**. For example, if contested draw file **363** corresponded to a draw for a bingo game, game sponsor **150** verifies that random numeric outcomes **110** would produce a "bingo" based on the cards in play and the algorithm used for generating bingo balls from random numeric outcomes **110** as specified in commit data **174**.

FIG. **6** is a flow chart illustrating the steps of generating a draw for a game of keno in one embodiment of the present invention. At step **410**, draw server **102** receives from client server **104** an outcome request **106** containing draw type indicator **170**, draw parameters **172**, and commit data **174**. Commit data **174** includes information indicating the numbers that currently have bets. Draw server **102** formats outcome request **106** to create draw request **206** at step **420**.

Using draw request **206**, draw server **102** generates one or more random numeric outcomes **110** based on draw type indicator **170** and draw parameters **172** at step **430**. At step **440**, draw server **102** creates unsigned draw file **314** that includes the random numeric outcomes **110** and commit data **174**. The draw server **102** digitally signs unsigned draw file **314** using private key **308** at step **450** creating draw file **208** with digital signature **312**. Draw server **102** saves a copy of the draw file **208** to audit log memory **212** at step **460**.

Draw server formats draw file **208** to create outcome file **108** at step **470**. At step **480**, draw server **102** communicates outcome file **108** to client server **104** for use in determining the winner of a game.

FIG. **7** is a flowchart illustrating the steps for authenticating the results of a keno game under a particular embodiment of the present invention. FIG. **7** relates to one embodiment of the present invention in which a game operator **160** possesses and operates both client server **104** and draw server **102**.

In step **510**, game sponsor **150** receives notice from game operator **160** that a winning result has occurred in the keno game. Game sponsor **150** obtains draw module **202** of draw server **102** in step **520**.

Game sponsor **150** reads audit log memory **212** of the draw module **202** in step **530**. In step **540**, game sponsor **150** verifies that the audit log memory **212** includes entries **350** for all the draws draw server **102** has conducted. If not, the audit log memory **212** has been tampered with and the results are invalid at step **550**.

If audit log memory **212** does have all the entries **350**, game sponsor **150** locates entry index **351** that matches game identifier **178** of the game which allegedly generated a win, contested entry index **354**. Similarly, game sponsor **150** locates key index **358** that corresponds to the time period in which draw server **102** generated random numeric outcomes **110** for the contested game, authenticating key index **358**. Using contested entry index **354** and authenticating key index **358**, game sponsor **150** accesses, at step **560**, contested entry **362** and authenticating key **359**. In step **570**, game sponsor **150** reads from the contested entry **362** a contested draw file **363** with contested signature **364**.

Utilizing conventional digital signature techniques, game sponsor **150** verifies in steps **580-600** that contested signature **364** was generated with a private key **308** associated with authenticating key **359**. In step **580**, game sponsor **150** applies authenticating algorithm **365** to contested draw file **363**, contested signature **364**, and authenticating key **359** to verify that draw server **102** generated contested draw file **363** and that contested draw file **363** has been unchanged since being signed. If both conditions are satisfied, at step **590**, authenticating algorithm **365** produces an affirmative response and the results are valid. However, if either condition is not satisfied, authenticating algorithm **365** does not produce an affirmative response and the results are invalid at step **600**.

If the results are valid, then at step **610** game sponsor **150** determines whether contested draw file **363** would have created a winning result based on random numeric outcomes **110** and commit data **174** of contested draw file **363**. Authentication results are shown at steps **620** and **630**.

Although the present invention has been described with several embodiments, a myriad of changes, variations, alterations, transformations, and modifications may be suggested to one skilled in the art, and it is intended that the present invention encompass such changes, variations, alterations, transformations, and modifications as fall within the scope of the appended claims.

What is claimed is:

1. A method for providing numeric outcomes to a game operator, comprising:

receiving a draw request that includes commit data that defines conditions under which random numeric outcomes to be generated will result in a win for a player of a game;

generating, with an electronic processor, a random numeric outcome based on the draw request;

communicating the random numeric outcome to a game operator to be used by the game operator to determine whether a win has occurred in the game;

generating a draw file that includes the random numeric outcome and the commit data;

digitally signing the draw file with a digital signature using a private key;

storing the draw file in an audit log in an electronic memory;

after storing the draw file, retrieving the draw file from the audit log;

verifying that the draw file has not been changed since being stored, wherein verifying that the draw file has not been changed since being stored comprises:

retrieving a public key associated with the private key used to sign the draw file, wherein the public key indicates that the digital signature for the draw file was generated using the associated private key; and

verifying, based on the public key, that the draw file has not been changed since being signed using the private key; and

confirming, based on information in the draw file, that the random numeric outcome resulted in a game win.

2. The method of claim **1**, wherein digitally signing the draw file comprises digitally signing the draw file with a private key associated with a current time, and wherein retrieving the public key comprises:

determining a time associated with the draw file; and

retrieving a public key associated with the determined time.

3. The method of claim **1**, wherein storing the draw file in an audit log comprises storing the draw file in an audit log that includes a plurality of draw files indexed by time.

4. The method of claim **1**, wherein receiving a draw request further comprises receiving a draw request that includes game parameters, wherein the game parameters describe parameters for one or more random numeric outcomes to be generated.

5. The method of claim **1**, wherein retrieving the draw file comprises:

receiving an indication that a random numeric outcome included in the draw file resulted in a game win; and

in response to receiving the indication, retrieving the draw file from the audit log.

6. A system for providing numeric outcomes to a game operator, comprising:

an interface module operable to receive a draw request that includes commit data defining conditions under which random numeric outcomes to be generated will result in a win for a player of a game from a remote element and transmit one or more random numeric outcomes to the remote element;

a random number generator operable to:

generate the one or more random numeric outcomes based on the draw request; and

generate a draw file that includes the random numeric outcome and the commit data;

a digital signature generator operable to:

generate a digital signature for the draw file using a private key;

store the signed draw file in an audit log memory;

after storing the draw file, retrieve the draw file from the audit log memory; and

verify that the draw file has not been changed since being stored;

a key memory operable to store a public key associated with the private key, wherein the public key indicates that the digital signature generator generated the digital signature for the draw file using the associated private key; and

the audit log memory operable to store an audit log comprising a plurality of signed draw files, wherein each of the signed draw files includes sufficient information to allow an operator of the system to confirm that the one or more random numeric outcomes included in that draw file resulted in a game win.

7. The system of claim **6**, wherein:

the digital signature generator is operable to generate a digital signature for the draw file using a private key associated with a current time; and

the key memory is operable to store a plurality of public keys and a plurality of private keys, wherein the public keys are indexed by time and each public key is associated with one of the private keys.

8. The system of claim **6**, wherein the audit log comprises a plurality of draw files indexed by time.

9. The system of claim **6**, wherein the interface module is operable to receive a draw request by receiving a draw request that includes game parameters and commit data, wherein the game parameters describe parameters for one or more random numeric outcomes to be generated.

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